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DEVELOPMENT AND TRANSFER OF TECHNOLOGIES

Progress report

Note by the secretariat

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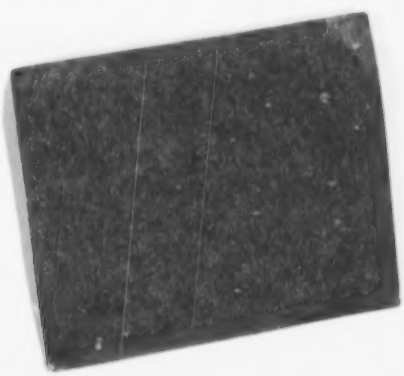

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I. INTRODUCTION

A. Mandate

1. The Conference of the Parties (COP), the Subsidiary Body for Scientific and Technological Advice (SBSTA) and the Subsidiary Body for Implementation (SBI) have requested the secretariat to undertake a number of tasks regarding technology and the transfer of technology. A summary of requests as of the fourth session of the SBSTA may be found in document FCCC/SB/1997/1.

2. Among several conclusions adopted at its fifth session, the SBSTA welcomed the activities underway to prepare reports on the terms of transfer, adaptation technologies, technology information centers and networks and on the technology transfer activities supported by the Parties, particularly Annex II Parties. It urged the secretariat to accelerate these activities and particularly noted the need to:

(a) Expand the technology needs survey instrument. This could be done by adapting a design to incorporate more information on specific technology needs, and expanding the survey to all non-Annex II Parties with a view to having a more comprehensive report for the seventh session of the SBSTA;

(b) Evaluate and assess the need to improve awareness of existing centers and networks and areas in which new resources could add value; prepare a report on existing centers and networks, modalities and financial implications regarding the possible establishment of one-stop specialized information centers for technology information, as well as regional technology centers;

(c) Update the technology inventory for the seventh session of the SBSTA.

3. The SBSTA also requested the Parties to provide comments and information to the secretariat, for its own use, on the tasks listed in the secretariat's progress report by 31 May 1997, particularly on new reports and software on environmentally sound technologies and know-how, for inclusion in an update of the technology inventory and database. The SBSTA reminded Parties of the need to submit, as soon as possible, additional nominations for the roster of experts to the secretariat, in particular, experts with a background in economic and financial aspects of the transfer of technolc ,y.

B. Scope of the note

4. This note provides a status report on four of the above topics, namely, an initial paper on terms of transfer, activit es underway to develop a series of papers on adaptation technologies, activities related to technology centers and networks and the technology inventory.

C. Possible action by the SBSTA

5. The SBSTA may wish to take note of this progress report and, where necessary, provide guidance for further work, for example, with regard to the topics to be treated in future reports on adaptation technologies. It may wish to urge Parties to provide information to the secretariat on new reports and software on environmentally sound technologies and know-how for inclusion in an update of the technology inventory and database by 15 August 1997.

II. TERMS OF TRANSFER

A. Introduction

6. By its decision 13/CP.1, the COP recalled the relevant provisions of chapter 34 of Agenda 21 on the transfer of environmentally sound technology, cooperation and capacity-building and recognized the provisions of the United Nations Framework Convention on Climate Change, in particular, Articles 4.1, 4.5, 4.7, 4.9, 9.2 and 11.1. On this basis, it requested the secretariat, *inter alia*, to collect information from relevant sources and to prepare an inventory and assessment of environmentally sound and economically viable technologies and know-how conducive to mitigating and adapting to climate change. This inventory should also include an elaboration of the terms under which transfers of such technologies and know-how could take place (FCCC/CP/1995/7/Add.1).

7. Further to this decision, at its third session, the SBSTA considered this issue on the basis of document FCCC/1996/CP/11 in which the secretariat had identified a number of topics that could be treated in a report. At its fifth session, the SBSTA took note of the progress report on technology and technology transfer prepared by the secretariat in which the secretariat further elaborated the list of topics that could be addressed in a series of papers, namely financial flows between countries, activities undertaken by governments to facilitate the introduction and use of environmentally sound technologies, private sector banks, small and medium enterprises and transnational corporations, and success stories from different countries (FCCC/SB/1997/1). It welcomed the activities underway on the terms of transfer and other issues, and urged the secretariat to accelerate its activities and requested Parties to submit comments on this and other technology subjects by 31 May 1997 (FCCC/SBSTA/1997/4).

8. The secretariat is currently collecting information and preparing its first technical paper on this subject (FCCC/SBSTA/1997/TP.1). Among the information to be presented will be an overview of financial flows between countries, with a focus on the flows from developed countries to developing countries and to countries with economies in transition. It will also provide selected information on the terms, conditions and financial criteria employed by multilateral lending institutions. This note presents findings which draw upon that

technical paper. Parties may wish to refer to that paper for more detailed information and as a guide to further readings.

9. In preparing the technical paper, the secretariat obtained financial information that differs in format among institutions. For example, the World Bank uses a classification based on per capita income, while the Organization for Economic Cooperation and Development (OECD) considers developing countries separate from the transition economies of Eastern Europe. In the OECD official flows to countries with economies in transition are considered as official aid rather than official development assistance [1]. In other cases, for example private investments by sector, very little data could be identified.

10. Since other institutions are conducting extensive analysis of these subjects, the secretariat will attempt to focus on the climate relevant aspects of the terms of transfer. As it is necessary to begin considering these issues in a broad context and because many economic activities affect greenhouse gases, the initial technical paper will provide basic information. Parties may wish to bear in mind that some of the policy aspects of this issue are under discussion in other forums, for example, the United Nations Commission on Sustainable Development (UNCSD).

11. Obtaining comparable data on financial terms and conditions that is relevant to the Convention is a problem. Quantitative and qualitative information about technology can not be directly derived from the data. Therefore, in order to support its activities to identify relevant information, the secretariat will convene a meeting of experts in mid-June 1997 in Bonn. The experts will be requested to advise the secretariat on the design of future papers, and sources of information. They will also be asked to provide technical reviews of draft papers. The secretariat will be particularly interested in obtaining better data, including for example information on programs that may provide preferential terms for environmentally sound technology and know-how.

B. Discussion

12. The issue of terms of transfer may be divided into two categories that have several aspects, namely, (a) the legal and institutional measures affecting the admission and establishment, the ownership and control, and operation of foreign goods (technologies), services and firms; and (b) the investment and financial measures affecting the transfer of technology. This paper provides information on the second of these, particularly the financial

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[1] According to the OECD, Official Development Assistance (ODA) is defined as those flows to developing countries and multilateral institutions provided by official agencies, including state and local governments, each transaction of which meets the following tests: a) it is administered with the promotion of the economic development and welfare of developing countries as its main objective; and b) it is concessional in character and conveys a grant element of at least 25 percent. Official Aid comprises flows which meet the tests of ODA, but are directed to countries on Part II of the Development Assistance Committee (DAC) List of Aid Recipients (like countries with economies in transition).

conditions of multilateral institutions, although many similar conditions affect private sector lending. Examples of topics in this category include, subsidies, loan guarantees and other import/export incentives. Examples of topics in the former category include ownership requirements, industrial and intellectual property agreements, performance requirements and operational permits and licenses. Subsequent papers will elaborate upon selected elements among these topics.

C. General Investment trends and financial flows

13. Almost all economic activities affect emissions and some affect the removals of greenhouse gases. Therefore, a consideration of the financial terms of transfer needs to be comprehensive. However, some sectors like the energy, industry, transportation, forestry, agriculture and waste management sectors are generally more climate relevant than others and deserve special attention as data become available.

14. Beginning with the broader context, financial flows[2] reached USD284.6 billion in 1996[3]. This represents USD47 billion or a 20 percent increase from 1995 and a 184 percent increase since 1990. These figures confirm the pace of continuous growth that has characterized most of the 1990s. The sources of capital have shifted dramatically in the last few years. In 1990, official development finance accounted for 56 percent of the total amount of financial flows, while in 1996 this percentage was 14 percent mainly due to the strong growth of private capital flows. Between 1995 and 1996 official source financing decreased by 23 percent or USD12.2 billion while the private capital flows increased by 32 percent or USD59.6 billion. Official financial flows have decreased by 27 percent since 1990.

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[2] The term "financial flows" is a broad concept that includes many different components. It is a general term integrating all the main forms of capital flows to low and middle income countries. (In this paper countries are classified on the basis of the World Bank classification system of low and middle income countries with 1995 per capita income of less than USD765 (low) and USD9,385 (middle), that includes both developing countries, countries with economies in transition and Greece (among middle income countries)). The main categories include:

Official development finance, including grants and loans directed to low and middle income countries, with the main objective of promoting economic development and welfare. The majority of official development finance is made by grants and other concessional finance (for example emergency relief and peacekeeping activities), while the remaining part are loans, generally with special terms and conditions. These types of financing are provided through two channels: Bilateral, made between governments with special agreements, and multilateral, set up mainly by development banks, international and regional funds and United Nations agencies.

Private flows, capital made up of debt flows (including lending by commercial banks, bonds and others) foreign direct investment and portfolio equity flows (investment in stocks traded internationally or locally).

[3] Preliminary data. Source: World Bank.

15. The decline in official finance flows is due mainly to cutbacks of ODA in developed countries. This trend does not appear likely to change significantly in the near future.[4] A second important aspect is the marked change in the composition of aid flows, for example the growing importance of emergency relief and peacekeeping activities[5] and the increase to support the reforms of the transition economies of Eastern Europe.

16. Private capital flows have experienced a substantial growth for several reasons. First, private capital markets in many developing countries have matured together with an improved creditworthiness and macro-economic management. This has increased investor confidence in some developing regions. Second, borrowing from commercial banks increased, due to private sector borrowers and greater use of guarantees from private banks. Third, foreign direct investment has continued to grow over the past years reaching a larger number of countries particularly in Latin America and Eastern Europe. This growth is related to investment reforms undertaken in many countries in order to attract foreign investors. Finally, portfolio equity flows also moved ahead. These external flows went directly to domestic stock markets through pension funds, mutual funds and other investment vehicles.

17. The Global Development Finance publication[6] of the World Bank shows that for the period 1990-1996 all regions experienced an increase in net flows, however, there are substantial differences among regions and countries. Countries that are not attractive to private capital suppliers relied primarily on official financing to supplement domestic savings while countries that have access to private capital markets enjoyed relevant financial inflows. The aggregate net long-term resource flows to developing countries and their main components is summarized in Table 1, in annex I of this document.

18. Countries with macro-economic stability and an environment that is attractive to business have been able to attract private capital flows (mainly among middle income countries). However, of the approximately USD60 billion increase in 1996, only about USD14 billion went to low income countries. Low income countries, excluding China and India which enjoy good market access, received an increase of slightly less than USD2 billion and a total of slightly more than USD7 billion in private flows in 1996. These countries have little access to bond markets and to medium to long-term commercial bank lending. However, in relative terms, flows to all income groups, including the low income countries, increased by a factor of about six between 1990 and 1996. Some regions experienced much greater inflows than others and one region (Sub-Saharan Africa[7]), had net outflows for two years (See Table 2, Annex I of this document).

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[4] Financial Issues of Agenda 21, United Nations, Third Expert Group Meeting, Manila, Philippines, 1996.

[5] OECD estimates that about 12 percent of all ODA is now devoted to emergency aid, compared with less than 2 percent in 1990.

[6] Global Development Finance, 1997. World Bank.

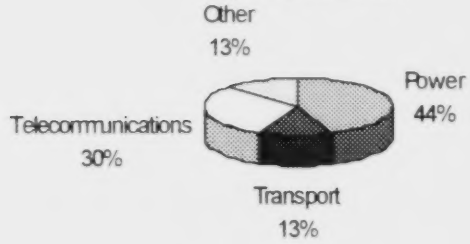
[7] Flows related to individual countries may be positive or negative and may vary over time.

19. Foreign direct investment forms an important economic link between developing and developed countries and, increasingly, among developing countries. In the recipient economies, it can contribute to physical capital formation, human capital development, transfer of technology and know-how, and expansion of markets and foreign trade. Most of foreign direct investments rely on activities undertaken by multinational corporations, but foreign investors have also been increasingly attracted to privatization projects in many developing countries. However, the distribution of private flows is far from even with many low income countries continuing to rely on official development finance

D. Investment trends by climate relevant sectors

20. The sectoral distribution of foreign direct investment in developing countries is not well documented, and statistics on transfer of environmentally sound technologies (ESTs) and their impact on greenhouse gases emissions are even more difficult to determine. However, some insights can be obtained by considering data on expenditures for infrastructure. Developing countries are increasingly financing their infrastructure through international capital markets, a trend reflected in the growth of their commercial bank borrowing and their increased use of bond and equity markets. This source of financing is mainly utilized to support infrastructure projects that are hard to finance, such as large power projects. The sectoral distribution of external financing of infrastructure in developing countries is shown in Figure 1. Better data, if collected and disseminated, would improve understanding about these investments.

Figure 1. Financing of infrastructure by sectors 1991-95



Source: Global Development Finance, 1997. World Bank.

21. Other information on investments in climate relevant sectors is available from the Global Environment Facilty (GEF) and the DAC of the OECD. The secretariat is analyzing this information.

E. Terms, conditions and financial criteria employed by multilateral lending institutions

22. Multilateral lending institutions apply different conditions to their lending activities. For example, the World Bank uses mainly two types of loans. One type is for developing countries that are able to pay near-market interest rates. The institution responsible for this kind of loan is the International Bank for Reconstruction and Development (IBRD). Another type of loan is for the poorest countries, which cannot obtain credit in the international financial markets and are therefore unable to pay near-market interest rates. Lending to the poorest countries is done by the International Development Association (IDA).

23. Other institutions have different criteria for their lending activities. The International Finance Corporation (IFC) a member of the World Bank Group, is the world's largest multilateral source of financing for private enterprises in emerging economies. The IFC offers a mix of financing that is tailored to meet the needs of each project. The Multilateral Investment Guarantee Agency (MIGA), the newest member organization of the World Bank Group, facilitates investments through the provision of investment guarantees against the risks of currency transfer, expropriation, and war and civil disturbance.

24. Regional banks, like the African Development Bank (Afdb), the Asian Development Bank (AsDB) and the Caribbean Development Bank (CDB) concentrate their activities on the specific needs of their respective regions. Therefore, their terms and conditions vary significantly.

25. Since the United Nations Conference on Environment and Development (UNCED) in 1992, in Rio de Janeiro, lending for environmental purposes has accelerated and major multilateral agencies are incorporating environmental considerations in their decision making. Multilateral agencies now regularly carry out environmental assessments of all new projects. In some cases, the requirement to conduct an environmental assessment is causing project developers to anticipate the potential for environmental technology at an earlier stage. Typically, projects are split into categories for assessment. The World Bank distinguishes between projects which require a full or partial environmental assessment or analysis.

F. Summary

26. Bearing in mind that this is the initial paper on terms of transfer and know-how, the following is a summary of the main points:

(a) "Terms of transfer" is a very broad issue covering both financial and other aspects such as measures affecting admission, establishment, ownership, control and operations of goods (technologies), services and firms.

(b) Very limited financial data is available on specific sectors, particularly data on private sector investments, relevant to the Convention. In some cases the data from different sources is contradictory. It is even more difficult to determine whether the increase in financing is devoted to projects that are climate "friendly" or not.

(c) Overall financial flows have expanded by 184 percent in the 1990s, particularly from the private sector, while official financial flows have decreased by 27 percent. Least developed countries received the smallest amount of financing, but on average private capital flows increased by a factor of six, about the same as the increase to other countries. There are large differences among the least developed countries in this respect.

(d) There are many sources of financing such as official development finance, including loans and grants provided by multilateral institutions and bilateral agreements and private sector finance, provided by commercial banks and private companies.

(e) Concessional financing, for example, which is available from the IDA, is dependent upon meeting criteria related to relative poverty, creditworthiness and other basic performance standards such as civil order.

(f) The commercial terms under which environmentally sound technologies could be transferred are related to the capability of countries to attract capital which is determined by their macro-economic stability. Key factors affecting the latter are low rates of inflation, sound fiscal management, structural policies, market reforms and the regulatory environment.

(g) Multilateral institutions now regularly carry out environmental assessments of all new projects. This is an important criterion for some forms of finance.

G. Questions the Parties may wish to consider

27. While the information provided above and in document FCCC/SBSTA/1997/TP.1 is preliminary, it raises a number of questions which the Parties may wish the secretariat to address:

(a) Should steps be taken to obtain better data on financial flows in relevant sectors and, if so, how?

(b) What institutional linkages with, for example, multilateral development banks should be developed and, if so, what should be the objective of such cooperation?

(c) Should further efforts be made to inform developing country Parties of the channels available and conditions for financing?

III. ADAPTATION TECHNOLOGIES

28. In response to the requests of the COP and the SBSTA to prepare a report on adaptation technologies, the secretariat convened a meeting of ten experts to obtain advice on its content and focus. These experts were taken from the roster of experts nominated by governments. To encourage co-ordination, the meeting was held in conjunction with an Intergovernmental Panel on Climate Change (IPCC) meeting on adaptation in Amsterdam from 20 to 22 March 1997. A report of the meeting, as developed by the experts, is provided in annex II of this document.

29. The group urged the secretariat to develop a work programme composed of the following: a) an overview paper on adaptation; b) focused papers, initially on technologies related to human health, food, security, coastal zones, urban areas and water; and c) a long-term "vision paper" that could set out technological goals in different sectors. On the basis of this advice, the secretariat has initiated activities to produce the overview paper for the seventh session of the SBSTA. The paper will include definitions and topics such as opportunities for adaptation, the role of technologies, decision tools, and other issues. With regard to the other papers, the secretariat will bear in mind the advice of the expert group to make maximum use of other organizations. It will give priority to the focused papers and, based on that experience, give consideration to a "vision paper", at a later stage.

IV. TECHNOLOGY INFORMATION CENTERS AND NETWORKS

30. The secretariat, with the support of the Climate Technology Initiative and financial assistance from the United States Environmental Protection Agency, is conducting a review and evaluation of available information on the extent, nature and functions of existing technology information centers and electronic information networks in developing countries and countries with economies in transition. This review will focus on sustainable energy technology, but will also include readily available information on technologies for other sectors. The review and evaluation will draw on available survey reports in the public domain including the United Nations Environment Programme (UNEP) Survey of Information Systems Related to Environmentally Sound Technologies, directories and internet information published by the World Energy Efficiency Association (WEEA), the work of the United Nations Development Programme (UNDP) and a United Nations Educational and Scientific and Cultural Organization (UNESCO) survey of centers of excellence on new and renewable sources of energy. It will also utilize available information on international activities such as Greentie and on national activities such as the Center for Renewable Energy and Sustainable Technology (CREST) in the United States.

31. An evaluation of existing centers and networks in a few countries and regional areas will also be undertaken to the extent possible. This could include compiling country or region specific lists of expert centers with preliminary information on the types of services provided, major data systems and sources used, clients served and views on unmet needs for

technology information and technical assistance in their country or region. It is anticipated that a preliminary background report will be available by the end of June 1997. The secretariat will hold a meeting of experts in late June 1997. The experts will be asked to provide advice on the technology information needs and the technical capacity of existing centers, to identify other sources of information and to further advise the secretariat in the preparation of a plan with options related to centers and networks.

V. TECHNOLOGY INVENTORY

32. As of 1 May 1997, the secretariat had not received new reports from Parties on environmentally sound technologies and know-how. The development of an updated inventory for the seventh session of the SBSTA depends upon the receipt of reports by 15 August 1997.

Annex I

Table 1. Aggregate net long-term resource flows to low and middle income countries (USD Billions)

Type of flow	1990	1991	1992	1993	1994	1995	1996
Aggregate net resource flows	101.0	123.0	146.0	212.0	207.0	237.2	284.6
Official development finance	56.3	65.6	55.4	55.0	45.7	53.0	40.8
Grants	29.2	37.3	31.6	29.3	32.4	32.6	31.3
Loans	27.1	28.3	23.9	25.7	13.2	20.4	9.5
Bilateral	11.6	13.3	11.3	10.3	2.9	9.4	-5.6
Multilateral	15.5	15.0	12.5	15.4	10.3	11.1	15.0
Total private flows	44.4	56.9	90.6	157.0	161.0	184.2	243.8
Debt flows	16.6	16.2	35.9	44.9	44.9	56.6	88.6
Commercial banks	3.0	2.8	12.5	-0.3	11.0	26.5	34.2
Bonds	2.3	10.1	9.9	35.9	29.3	28.5	46.1
Others	11.3	3.3	13.5	9.2	4.6	1.7	8.3
Foreign direct investment	24.5	33.5	43.6	67.2	83.7	95.5	109.5
Portfolio equity flows	3.2	7.2	11.0	45.0	32.7	32.1	45.7

Source: Global Development Finance, 1997. World Bank.

Table 2. Net private capital flows to low and middle income countries by country group (USD Billions)

Country group	1990	1991	1992	1993	1994	1995	1996
All countries	44.4	56.9	90.6	157.1	161.3	184.2	243.8
Sub-Saharan Africa	0.3	0.8	-0.3	-0.5	5.2	9.1	11.8
East Asia and the Pacific	19.3	20.8	36.9	62.4	71.0	84.1	108.7
South Asia	2.2	1.9	2.9	6.0	8.5	5.2	10.7
Europe and Central Asia	9.5	7.9	21.8	25.6	17.2	30.1	31.2
Latin America and Caribbean	12.5	22.9	28.7	59.8	53.6	54.3	74.3
Middle East and North Africa	0.6	2.2	0.5	3.9	5.8	1.4	6.9
Income group							
Low-income countries excluding China and India	1.4	3.0	2.4	5.8	6.3	5.5	7.1
China and India	10.0	9.1	23.0	44.2	50.8	47.9	60.0
Middle-income countries	32.0	44.0	64.8	107.1	104.2	130.7	176.7

Source: Global Development Finance, 1997. World Bank.

Annex II

UNFCCC Expert Meeting on Adaptation Technologies

Amsterdam
20-22 March 1997

1. In response to the request of the SBSTA to prepare a report on adaptation technologies, the UNFCCC secretariat convened a meeting of ten experts to obtain advice its content and focus. To encourage co-ordination, the meeting was held in conjunction with an IPCC meeting on adaptation in Amsterdam from 20 to 22 March 1997. Each of the experts made brief presentations on the role of climate and adaptation in various sectors and regions, including agriculture, human health, water resources, coastal zones, forestry, and infrastructure. The group elected Professor Wojciech Suchorzewski as a Chairperson to conduct the meeting. The list of participants is provided in the appendix to this document.

2. Adaptation was defined as a process of adjusting practices, processes and structures to reduce the adverse effects of global climate change and to take advantage of the potential benefits. It was noted that adaptation technologies must be considered in the context of broader strategies and policies to foster adaptation at the national, regional and local levels and as a means of improving human development. It was recognized that adaptation technologies should include both hard technologies and soft technologies, including processes and tools. The design specifications for new technologies, however, require reducing uncertainties about future climate changes through improved monitoring and modelling. It was noted that adaptive and mitigating measures generally have different objectives, while the former aims to reduce the adverse impacts or enhance the benefits of climate change and the latter aims to reduce GHG emissions or to increase sequestration by sinks. However, there are some measures that could serve both objectives and others that could be counter productive. An example of a measure that could achieve both objectives is tree planting in cities to store carbon and reduce heat islands. A conflicting measure might be the use of farming practices which increase the production of rice, thereby providing greater food security, but increasing methane emissions.

3. In order to advance the role of technology in adaptation, it is desirable to develop a process for the identification and evaluation of existing technologies and possible future technologies. One framework for classification of technology was presented at the meeting, which simply listed types of technologies (present, future, hard, soft) against areas of need organized by regions / sectors and by adverse processes. In addition to the need for a classification framework, there is the more difficult matter of technology evaluation and assessment. A number of criteria were discussed (costs and benefits, environmental compatibility, social and legal acceptability and spatial and regional linkages). These criteria may need further elaboration.

4. Regarding the focus of the report to the SBSTA, the group urged the secretariat to develop a work programme composed of the following: a) an overview paper on adaptation; b) focused papers, initially on technologies related to human health, food, security, coastal zones, urban areas and water; and c) a long-term "vision paper" that would set out technological goals in different sectors. The focused paper would draw on the work of the IPCC, particularly a list of adaptive technologies and strategies compiled from the Second Assessment Report (SAR) and on information from other international and national organizations. These papers could also include a discussion of the tools needed to reduce damages from current climatic events, as well as damages that could occur in the long-term. It was stressed that maximum use should be made of international organizations and institutions with specialized expertise who could contribute to such papers. An elaboration of the rational for focused papers is given below.

A. Food security

5. During the past few years and recent decades, some countries in the world, especially in Africa and Asia, have experienced acute food shortages largely due to drought and have become more dependent on food aid from developed nations (Food and Agriculture Organization (FAO) Food Security Conference 1996). Yields per hectare of cereal crops have either stagnated or declined largely because prices for seed, fertilizer, machinery and irrigation have increased to levels beyond the reach of resource poor farmers. Irrigated agriculture which expanded in the 1970's is also unlikely to expand further in the years to come unless farm incomes rise. The problem of food shortage is, therefore, very sensitive to current and possible future changes in climate. Adaptation technologies need to be identified and developed to increase production, improve resiliency, strengthen protection and improve storage and processing of food in the developing countries.

B. Urban areas

6. About 150,000 people are added to the urban population of developing countries every day, and most of this growth happens in large cities. By 1990, there were 21 mega-cities (with population exceeding 8 million), 16 of them in developing countries. In 2015, there will be 33 mega-cities, 27 in developing countries. The number of so called million cities (between 1 and 10 million inhabitants) will grow from 270 in 1990 to 516 in 2015. The inhabitants of large cities are likely to be particularly vulnerable to climate change and resulting adverse impacts such as extreme air pollution, heat islands, flood and storm events and vectors borne diseases. Increasing potential adaptive capacities of urban areas in developing countries is, therefore, of great importance.[8]

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[8] Source: The Urban Environment. A Special reprint for World Resources 1996-1997. A joint publication of The World Research Institute, UNEP, UNDP, the World Bank. Oxford University Press, 1996. Pages: 4,8-9.

C. Coastal zone

7. Much of the world's population lives along the coast. The coastal zone provides a number of important resources and functions critical to human society and natural systems. The coastal zone will be one of the first areas affected by climate change. Sea-level rise, coupled with increased storminess, will exacerbate the rate and intensity of erosion of the coastal areas, affecting human activity and infrastructure. Possible adaptive measures could include lowering the cost of current technologies and improving national and local planning, taking into account sea-level rise and coastal erosion in infrastructure design and the situation of new facilities, particularly for tourism.

D. Health

8. Human health impacts were considered as being among the important potential threats of climate change in the IPCC's Second Assessment Report (SAR). Most impacts would occur via complex and mostly indirect pathways. The greatest losses in human health could occur in the developing countries, as adaptive capabilities in those countries are much less than in developed countries, due to socio-economic and technological factors. Adaptive capabilities to cope with climate change would need strengthening at two levels: (1) present levels and ranges of climate related health risks, and (2) novel types of health risks associated with climate change.

E. Water

9. In many regions of the world, water availability and quality is currently a problem. Climate changes may lead to alteration in precipitation patterns, which could modify the distribution of water in time and space. As a direct consequence, this phenomenon may magnify both drought and flood events thus affecting agriculture, industry, water supply and natural ecosystems with corresponding economic damages and human losses. In order to cope with these problems, there is a need to develop and apply adaptive technologies, including integrated water management risk alert simulation models.

F. Natural ecosystems

10. As determined by the SAR, natural ecosystems are subjected to stresses from biodiversity loss, deforestation and desertification and are particularly sensitive to impacts from global climate change. Adaptive technologies for the reduction of climate related impacts in natural ecosystems may include most of those already under consideration under the Biodiversity Convention, thereby eliminating the need for a significant effort by the secretariat of the UNFCCC. As natural ecosystems represent the most crucial "life-support" systems of our planet, adaptive technologies for the protection of the supportive functions of natural ecosystems could be considered wherever relevant in each of the five priority areas listed above.

Appendix

List of participants

- Dr. James Aston
  South Pacific Regional Environment Programme, Western Samoa
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